Review for Test #5
4.5-4.7

Name _____
Date _____ **Period** _____

Find the following for each given equation.

1. $y = 2\csc\left(3\left(x - \frac{\pi}{2}\right)\right) - 1$ $\quad \frac{n\pi}{3} + \frac{\pi}{2}$

Period $\frac{2\pi}{3}$ range $(-\infty, -3] \cup [1, \infty)$

Asy Equation $x = \frac{n\pi}{3} + \frac{\pi}{2}$

3 con asy $\frac{\pi}{2}$ $\frac{5\pi}{6}$ $\frac{7\pi}{6}$

2. $y = \sec\left(\frac{1}{4}\left(x + \frac{\pi}{2}\right)\right) - 2$ $\quad \frac{2\pi}{\frac{1}{4}} = 8\pi$ $\quad \frac{\frac{\pi}{2} + n\pi - \frac{\pi}{2}}{\frac{1}{4}} = 2\pi + n4\pi - \frac{\pi}{2}$

Period 8π range $(-\infty, -3] \cup [-1, \infty)$

Domain $\{x \mid x \neq \frac{3\pi}{2} + n \cdot 4\pi\}$

3 con asy $\frac{3\pi}{2}$ $\frac{11\pi}{2}$ $\frac{19\pi}{2}$

3. $y = 4\tan(3(x + \pi)) - 5$ $\quad \frac{\frac{\pi}{2} + n\pi}{3} - \pi = \frac{\pi}{6} + \frac{n\pi}{3} - \pi$

Period $\frac{\pi}{3}$ range $(-\infty, \infty)$

Domain $\{x \mid x \neq -\frac{5\pi}{6} + \frac{n\pi}{3}\}$

3 con asy $-\frac{5\pi}{6}$ $-\frac{\pi}{2}$ $-\frac{\pi}{6}$

4. $y = -5\cot\left(\frac{1}{2}\left(x + \frac{\pi}{3}\right)\right) - 1$ $\quad \frac{\pi}{\frac{1}{2}} = 2\pi$ $\quad \frac{n\pi - \frac{\pi}{3}}{\frac{1}{2}} = n \cdot 2\pi - \frac{\pi}{3}$

Period 2π range $(-\infty, \infty)$

Asy Equation $x = n \cdot 2\pi - \frac{\pi}{3}$

3 con asy $-\frac{\pi}{3}$ $\frac{5\pi}{3}$ $\frac{11\pi}{3}$

Provide the following information, then sketch the graph.

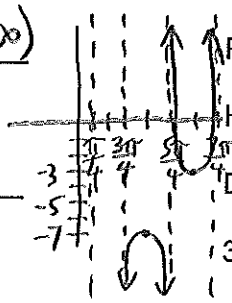
5. $y = -2\sec(2x - 2\pi) - 5$ $\quad \frac{2\pi}{2} = \pi$ $\quad \frac{2(x - \pi)}{2}$ $\quad \frac{\frac{\pi}{2} + n\pi}{2} + \pi = \frac{\pi}{4} + \frac{n\pi}{2} + \pi$

Period π range $(-\infty, -7] \cup [-3, \infty)$

Horizontal phase shift Right π

Asy Equation $x = \frac{5\pi}{4} + n\frac{\pi}{2}$

3 con asy $\frac{3\pi}{4}$ $\frac{5\pi}{4}$ $\frac{7\pi}{4}$



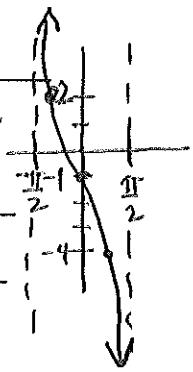
6. $y = 3\cot\left(2\left(x + \frac{\pi}{2}\right)\right) - 1$ $\quad \frac{n\pi - \frac{\pi}{2}}{2}$

Period $\frac{\pi}{2}$ range $(-\infty, \infty)$

Horizontal phase shift Left $\frac{\pi}{2}$

Domain $\{x \mid x \neq \frac{n\pi}{2} - \frac{\pi}{2}\}$

3 con asy $-\frac{\pi}{2}$ 0 $\frac{\pi}{2}$



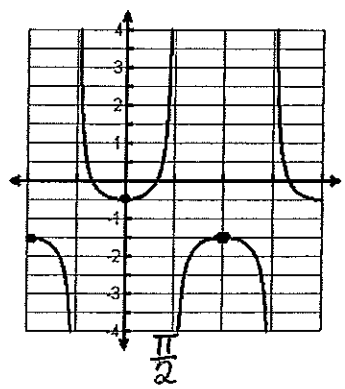
Write the equations for the following graphs.

10. y = $\frac{1}{2}\sec(x) - 1$

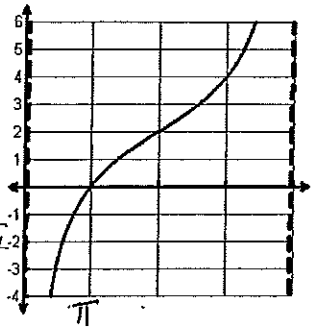
11. y = $-2\cot\left(\frac{1}{4}x\right) + 2$

12. y = $\frac{1}{2}\tan\left(\frac{2}{3}x\right) - 3$

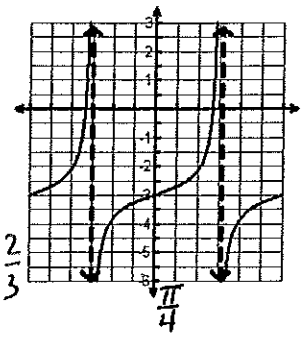
Sec
$c = 0$
$d = -1$
$a = \frac{1}{2}$
$b = \frac{2\pi}{2\pi} = 1$



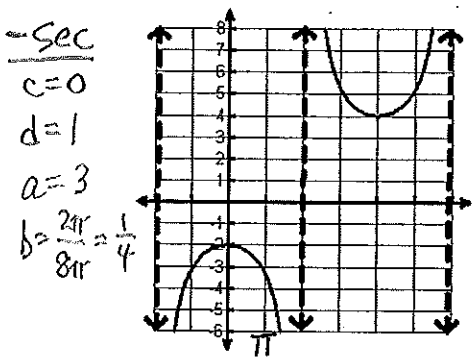
$-\cot$
$c = 0$
$d = 2$
$a = 2$
$b = \frac{\pi}{4\pi} = \frac{1}{4}$



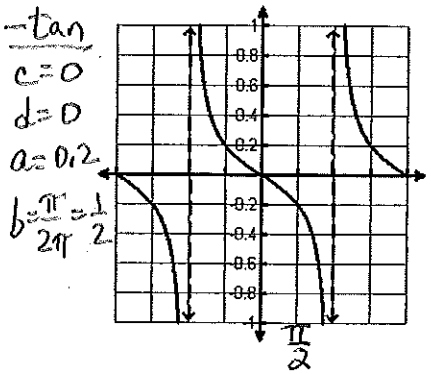
tan
$c = 0$
$d = -3$
$a = \frac{1}{2}$
$b = \frac{\pi}{\frac{6\pi}{4}} = \frac{2}{3}$



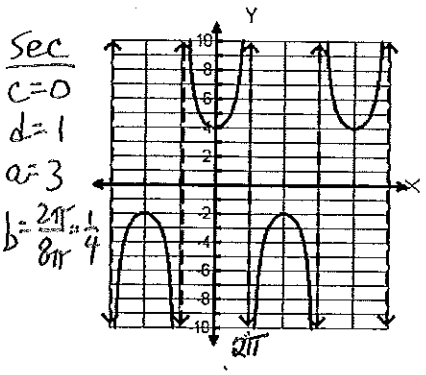
13. $y = -3\sec\left(\frac{1}{4}x\right)+1$



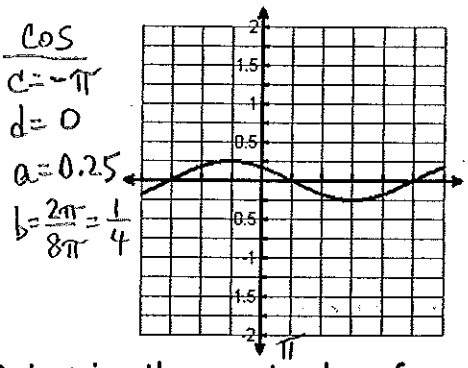
14. $y = -0.2\tan\left(\frac{1}{2}x\right)$



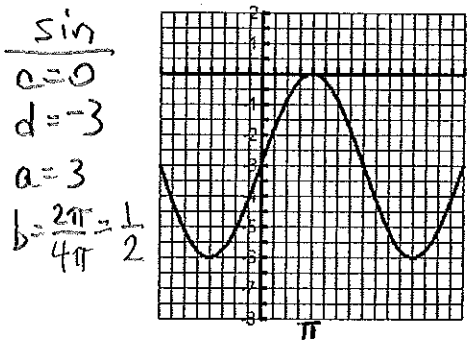
15. $y = 3\sec\left(\frac{1}{4}x\right)+1$



16. $y = 0.25\cos\left(\frac{1}{4}(x+\pi)\right)$



17. $y = 3\sin\left(\frac{1}{2}x\right)-3$



Determine the exact value of each expression. No decimals! All angle should be in radians in terms of π.

18. $Cos^{-1}\left(-\frac{1}{2}\right)$ = $120° = \frac{2\pi}{3}$

19. $Tan\left(Arc\sin\left(-\frac{1}{\sqrt{2}}\right)\right)$ = $Tan(-45°) = -1$

20. $Sin^{-1}\left(\sin\left(\frac{7\pi}{6}\right)\right)$ = $\sin^{-1}\left(-\frac{1}{2}\right) = -30° = -\frac{\pi}{6}$

21. $ArcCos\left(Sin\left(-\frac{\pi}{4}\right)\right)$ = $\cos^{-1}\left(-\frac{1}{\sqrt{2}}\right) = 135° = \frac{3\pi}{4}$

22. $Csc\left(\tan^{-1}(0)\right)$ = $\csc(0°) =$ Undefined

23. $Sin\left(Cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right)$ = $\sin(150°) = \frac{1}{2}$

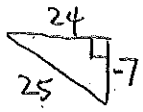
24. $Sin^{-1}\left(Cos\left(\frac{\pi}{2}\right)\right)$ = $\sin^{-1}(0) = 0° = 0$

25. $\tan^{-1}\left(-\sqrt{3}\right)$ = $-60° = -\frac{\pi}{3}$

26. $\sin^{-1}\left(-\frac{1}{2}\right)$ = $-30° = -\frac{\pi}{6}$

27. $ArcSin(Cos\,\pi)$ = $\sin^{-1}(-1) = -90° = -\frac{\pi}{2}$

28. $Cot\left(Sin^{-1}\left(-\frac{7}{25}\right)\right)$ = $\frac{24}{-7}$



29. $Csc\left(\tan^{-1}(-6)\right)$ = $\frac{\sqrt{37}}{-6}$

30. $\cot\left(\tan^{-1}\left(\frac{3}{4}\right)\right)$ = $\frac{4}{3}$

31. $Sin^{-1}\left(Cos\left(-\frac{\pi}{3}\right)\right)$ = $\sin^{-1}\left(-\frac{1}{2}\right) = -30° = -\frac{\pi}{6}$

III. Use a calculator to evaluate the expression. Round to the nearest hundredth.

32. $\text{Arccos}(-.524)$ 2.12

33. $\text{Arcsin}(.378)$ .39

34. $\tan^{-1}(-6.75)$ -1.42

35. $\sin^{-1}(.545)$ .58

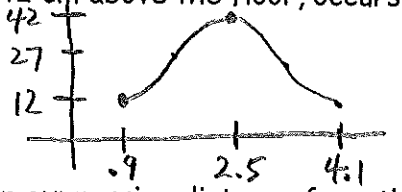
36. $\text{Arctan}(-2.962)$ -1.25

37. $\cos^{-1}(-3.781)$ Not Possible

Round answers to three decimal places.

38. A weight attached to the end of a long spring is bouncing up and down. As it bounces, its distance from the floor varies sinusoidally with time. You start a stopwatch. When the stopwatch reads .9 seconds, the weight first reaches a low point 12 cm above the floor. The next high point, 42 cm above the floor, occurs at 2.5 seconds.

Sketch the graph.



$-\cos$

$c = .9$ $\quad a = 15$

$d = 27$ $\quad b = \frac{2\pi}{3.2}$

a. Write an equation expressing distance from the floor in terms of the number of seconds the stopwatch reads.

$y = -15\cos\left(\frac{2\pi}{3.2}(x - .9)\right) + 27$

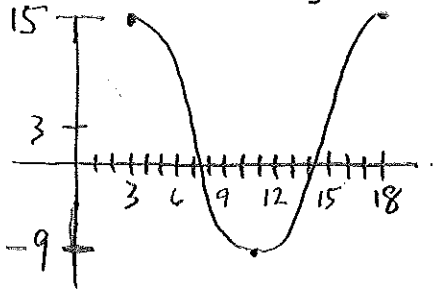
b. Predict the distance from the floor when the stopwatch reads 13.6 seconds?

12.288 cm

c. At what time will the spring be 24 cm for the third time? 3.403 seconds

39. A waterwheel with a radius of 12 feet is positioned so that its center is 3 feet above the water. The waterwheel rotates at 4 revolutions per minute. You start your stopwatch. Three seconds later, Point P on the rim is at its greatest height.

Sketch the graph.



period $= \frac{60}{4} = 15$ seconds

$\cos$

$c = 3$ $\quad a = 12$

$d = 3$ $\quad b = \frac{2\pi}{15}$

a. Write an equation assuming y varies sinusoidally with t, where y is the distance of point P from the surface of the water in terms of the number of t seconds that the stopwatch reads.

$y = 12\cos\left(\frac{2\pi}{15}(x - 3)\right) + 3$

b. What distance from the water will point P be after 23 seconds?

-3 ft = 3 feet under water

c. What time will the point on the wheel enter the water for the second time?

22.353 seconds